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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/501,125

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Johan O. A. Robertsson

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02/23/2007

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EXAMINER

HUGHES, SCOTT A

ART UNIT

PAPER NUMBER

3663

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
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3 MONTHS

02/23/2007

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary

Application No.

10/501,125

Applicant(s)

ROBERTSSON, JOHAN O. A.

Examiner

Scott A. Hughes

Art Unit

3663

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 12 January 2007.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-23 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-23 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 08 July 2004 is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date 1/12/2007.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 11/22/2006 has been entered.

Response to Arguments

Applicant's arguments filed 11/22/2006 have been fully considered but they are not persuasive.

Applicant argues that the Yan 2001 reference does not detect direct arrival from a down-going component of the wavefield. Yan teaches that direct arrival is a component of the down-going wavefield. Yan teaches that the direct arrival is identified from the representations of the wavefields acquired in the survey, and this meets the claim limitations since the "parameter" of the claims is a broad limitation that can be anything relating to the acquired wavefields. Further, Yan teaches identifying the direct arrival in the acquired down-going wavefield obtained from pressure waves. This reads on the method steps of the claim limitations, as the limitations are broad.

Claim Rejections - 35 USC § 103

Art Unit: 3663

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-6, 8-11, 15-18, and 20-23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yan (CREWES 2001) in view of Corrigan (5696734).

With regard to claim 1, Yan discloses a method of processing acoustic data acquired at a receiver (abstract). Yan discloses processing the acoustic data to obtain at least a down-going component of a parameter of the acquired acoustic data (Pages 322, 334-338, 341) (Figs. 14-17, 23). Yan discloses using at least down-going component of the parameter to identify the direct arrival at the receiver of acoustic energy emitted by a source (Pages 322, 334-338, 341) (Figs. 14-17, 23). Yan discloses that the down-going wavefield contains the direct arrival, and shows its detection with the down-going components in Fig. 23. Yan shows identifying the direct arrival (from breaks) after processing the acoustic data to obtain information about a parameter of the acoustic log (pressure related to time acquired by receivers) in Figs. 14-17. Yan does not specifically disclose that the process shown in the figures and described in the paper is done by a computer. Corrigan teaches that data analysis of marine seismic data including pressure data and particle motion data is done using a computer system which collects data from all sensors and analyzes the data according to a method of data analysis (abstract; Columns 5-6) (Fig. 4). It would have been obvious to modify Yan to include using a computer system to implement the data collection and analysis

Art Unit: 3663

of the method described as taught by Corrigan in order to have a device to process all of the data and store the results for further analysis or retrieval.

With regard to claim 2, Yan discloses identifying, in the down-going component of the parameter, the direct arrival of acoustic energy emitted by a source (Pages 322, 334-338, 341) (Figs. 14-17, 23).

With regard to claim 3, Yan discloses that the parameter of acoustic data is pressure (321, Introduction to 322; 334-338; 341) (Figs. 14-17, 23).

With regard to claim 4, Yan discloses determining the down-going component of the pressure from the pressure acquired at the receiver and from either the vertical component of the particle motion acquired at the receiver or the vertical component of the pressure gradient acquired at the receiver (321, Introduction to 322; 334-338, 341) (Fig. 23). Yan discloses using pressure and vertical component of particle motion (velocity) to separate the wavefield into up-going and down-going waves.

With regard to claim 5, Yan discloses that the parameter of acoustic data is the vertical component of particle motion acquired at the receiver (321, Introduction to 322; 327-329; 341) (Figs. 14-17; 23). Yan discloses using pressure and vertical component of particle motion (velocity) to separate the wavefield into up-going and down-going waves.

With regard to claim 6, Yan discloses determining the down-going component of the vertical component of particle motion from the pressure acquired at the receiver and from either the vertical component of the particle motion acquired at the receiver or the vertical component of the pressure gradient acquired at the receiver (321, Introduction

Art Unit: 3663

to 322; 327-329; 341) (Figs. 14-17, 23). Yan discloses using pressure and vertical component of particle motion (velocity) to separate the wavefield into up-going and down-going waves.

With regard to claim 8, Yan discloses that the vertical component of particle motion is the vertical component of particle velocity (321, Introduction to 322; 327-329; 341).

With regard to claim 9, Yan discloses that the step of determining the down-going component of the pressure comprises determining P^D as defined by the applicant (322, equations 1,2).

With regard to claim 10, Yan discloses processing at least the down-going component of the parameter of the acoustic data thereby to derive a further parameter of the acoustic data, and identifying in the further parameter, the direct arrival at the receiver of acoustic energy emitted at a source (321, Introduction to 322; 327-329; 341) (Figs. 14-17, 23). Yan discloses identifying the direct arrival wavefield in the down-going wavefield (341).

With regard to claim 11, Yan discloses that the further parameter is the direct arrival wavefield (321, Introduction to 322; 327-329; 341) (Figs. 14-17, 23).

With regard to claim 15, Yan discloses a method of seismic surveying (abstract). Yan discloses actuating a source of acoustic energy to emit acoustic energy, acquiring acoustic data at a receiver (Figs. 14-17, 23-24), and processing the acoustic data according to a method defined in claim 1 (321, Introduction to 322; 327-329; 341).

With regard to claim 16, Yan discloses an apparatus for processing acoustic data acquired at a receiver (abstract). Yan discloses means for processing the acoustic data to obtain at least a down-going component of a parameter of the acoustic data (Page (Pages 322, 334-338, 341) (Figs. 14-17, 23). Yan discloses a means for identifying the direct arrival at the receiver of acoustic energy emitted by a source, using at least the down-going component of the parameter (Pages 322, 334-338, 341) (Figs. 14-17, 23). Yan discloses that the down-going wavefield contains the direct arrival, and shows its detection with the down-going components in Fig. 23. Yan shows identifying the direct arrival (from breaks) after processing the acoustic data to obtain information about a parameter of the acoustic log (pressure related to time acquired by receivers) in Figs. 14-17. Yan does not specifically disclose the components of the apparatus or that it is a computing apparatus that is used in the data analysis. Corrigan teaches that data analysis of marine seismic data including pressure data and particle motion data is done using a computer system which collects data from all sensors and analyzes the data according to a method of data analysis (abstract; Columns 5-6) (Fig. 4). It would have been obvious to modify Yan to include using a computer system as the computing apparatus to implement the data collection and analysis of the method described as taught by Corrigan in order to have a device to process all of the data and store the results for further analysis or retrieval.

With regard to claim 17, Yan discloses that the means for identifying the direct arrival are adapted to identify the direct arrival in the down-going component of the parameter (Pages 322, 334-338, 341) (Figs. 14-17, 23).

With regard to claim 18, Yan discloses means for processing at least the down-going component of the parameter of the acoustic data thereby to derive a further parameter of the acoustic data, and wherein the means for identifying the direct arrival are adapted to identify the direct arrival in the further parameter (321, Introduction to 322; 327-329; 341) (Figs. 14-17, 23). Yan discloses identifying the direct arrival wavefield in the down-going wavefield (341).

With regard to claim 20, Yan does not disclose a programmable data processor. From the references and the figures of the data obtained in the references, it is obvious that a computer was used. Yan does not specifically disclose a computer with a programmable data processor. Corrigan discloses a computer system including a programmable data processor for taking seismic data measurements and processing the data using ocean bottom hydrophones and geophones (Fig. 4) (abstract; Columns 5-6). It would have been obvious to modify Yan (CREWES 2000 or 2001) to include a computer with a programmable processor to process the data obtained by the hydrophones and geophones as taught by Corrigan in order to have a device to quickly and efficiently process the data and control the system.

With regard to claim 21, Yan does not disclose a storage medium containing a program for the data processor of claim 20. Corrigan discloses a computer system including a programmable data processor and a storage medium containing a program (hard disk, floppy disk, magnetic tape) for taking seismic data measurements and processing the data using ocean bottom hydrophones and geophones (Fig. 4) (abstract; Columns 5-6). It would have been obvious to modify Yan (CREWES 2000 or 2001) to

Art Unit: 3663

include a computer with a programmable processor and storage medium containing a program to process the data obtained by the hydrophones and geophones as taught by Corrigan in order to have a device to quickly and efficiently process the data and control the system.

With regard to claim 22, Yan discloses a seismic surveying apparatus comprising a source of acoustic energy, a receiver spatially separated from the source, and an apparatus as defined in claim 16 (321-322; 327-329; 341) (Figs. 14-17, 23-24).

With regard to claim 23, Yan discloses a ranging apparatus comprising a source of acoustic energy, a receiver located proximate to the source (Figs. 23-24), and an apparatus as defined in claim 16 (321-322; 327-329; 341) (Figs. 14-17, 23).

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-6, 8, 10-11, 15-18, and 20-23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yan (CREWES 2000) in view of Corrigan (5696734).

With regard to claim 1, Yan discloses a method of processing acoustic data acquired at a receiver (abstract). Yan discloses processing the acoustic data to obtain at least a down-going component of a parameter of the acquired acoustic data. Yan discloses using at least down-going component of the parameter to identify the direct arrival at the receiver of acoustic energy emitted by a source (Page 1, 4-6; Page 7,

Art Unit: 3663

Numerical Examples to Page 9) (Figs. 1-5). Yan discloses that the down-going wavefield contains the direct arrival, and states the time of its detection compared to the other down-going reverberations. Therefore, Yan uses the down-going component of the pressure and particle velocity data to identify the direct arrival. The parameter from which the down-going component is taken is the pressure and particle velocity. Yan does not specifically disclose that the process shown in the figures and described in the paper is done by a computer. Corrigan teaches that data analysis of marine seismic data including pressure data and particle motion data is done using a computer system which collects data from all sensors and analyzes the data according to a method of data analysis (abstract; Columns 5-6) (Fig. 4). It would have been obvious to modify Yan to include using a computer system to implement the data collection and analysis of the method described as taught by Corrigan in order to have a device to process all of the data and store the results for further analysis or retrieval.

With regard to claim 2, Yan discloses identifying, in the down-going component of the parameter, the direct arrival of acoustic energy emitted by a source (Page 1, 4-6; Page 7, Numerical Examples to Page 9) (Figs. 1-5). Yan discloses that the down-going wavefield contains the direct arrival, and states the time of its detection compared to the other down-going reverberations. Therefore, Yan uses the down-going component of the pressure and particle velocity data to identify the direct arrival. The parameter from which the down-going component is taken is the pressure and particle velocity.

With regard to claim 3, Yan discloses that the parameter of acoustic data is pressure (Page 1, 4-6; Page 7, Numerical Examples to Page 9) (Figs. 1-5). Yan uses

the down-going component of the pressure and particle velocity data to identify the direct arrival. The parameter from which the down-going component is taken is the pressure and particle velocity.

With regard to claim 4, Yan discloses determining the down-going component of the pressure from the pressure acquired at the receiver and from either the vertical component of the particle motion acquired at the receiver or the vertical component of the pressure gradient acquired at the receiver (Page 1, 4-6) (Figs. 1-5).

With regard to claim 5, Yan discloses that the parameter of acoustic data is the vertical component of particle motion acquired at the receiver (Page 1, 4-6) (Figs. 1-5).

With regard to claim 6, Yan discloses determining the down-going component of the vertical component of particle motion from the pressure acquired at the receiver and from either the vertical component of the particle motion acquired at the receiver or the vertical component of the pressure gradient acquired at the receiver (Page 1, 4-6) (Figs. 1-5).

With regard to claim 8, Yan discloses that the vertical component of particle motion is the vertical component of particle velocity (Page 1, 4-6) (Figs. 1-5).

With regard to claim 10, Yan discloses processing at least the down-going component of the parameter of the acoustic data thereby to derive a further parameter of the acoustic data, and identifying in the further parameter, the direct arrival at the receiver of acoustic energy emitted at a source (Page 1, 4-6) (Figs. 1-5). Yan discloses finding the down-going wavefield, which contains the direct arrival wavefield.

With regard to claim 11, Yan discloses that the further parameter is the direct arrival wavefield (Page 1, 4-6) (Figs. 1-5).

With regard to claim 15, Yan discloses a method of seismic surveying. Yan discloses actuating a source of acoustic energy to emit acoustic energy, acquiring acoustic data at a receiver, and processing the acoustic data according to a method defined in claim 1.

With regard to claim 16, Yan discloses an apparatus for processing acoustic data acquired at a receiver. Yan discloses means for processing the acoustic data to obtain at least a down-going component of a parameter of the acoustic data. Yan discloses a means for identifying the direct arrival at the receiver of acoustic energy emitted by a source, using at least the down-going component of the parameter (Page 1, 4-6; Page 7, Numerical Examples to Page 9) (Figs. 1-5). Yan discloses that the down-going wavefield contains the direct arrival, and states the time of its detection compared to the other down-going reverberations. Therefore, Yan uses the down-going component of the pressure and particle velocity data to identify the direct arrival. The parameter from which the down-going component is taken is the pressure and particle velocity. Yan does not specifically disclose the components of the apparatus or that it is a computing apparatus that is used in the data analysis. Corrigan teaches that data analysis of marine seismic data including pressure data and particle motion data is done using a computer system which collects data from all sensors and analyzes the data according to a method of data analysis (abstract; Columns 5-6) (Fig. 4). It would have been obvious to modify Yan to include using a computer system as the computing apparatus

Art Unit: 3663

to implement the data collection and analysis of the method described as taught by Corrigan in order to have a device to process all of the data and store the results for further analysis or retrieval.

With regard to claim 17, Yan discloses that the means for identifying the direct arrival are adapted to identify the direct arrival in the down-going component of the parameter (Page 1, 4-6; Page 7, Numerical Examples to Page 9) (Figs. 1-5).

With regard to claim 18, Yan discloses means for processing at least the down-going component of the parameter of the acoustic data thereby to derive a further parameter of the acoustic data, and wherein the means for identifying the direct arrival are adapted to identify the direct arrival in the further parameter (Page 1, 4-6) (Figs. 1-5). Yan discloses finding the down-going wavefield, which contains the direct arrival wavefield.

With regard to claim 20, Yan does not disclose a programmable data processor. From the references and the figures of the data obtained in the references, it is obvious that a computer was used. Yan does not specifically disclose a computer with a programmable data processor. Corrigan discloses a computer system including a programmable data processor for taking seismic data measurements and processing the data using ocean bottom hydrophones and geophones (Fig. 4) (abstract; Columns 5-6). It would have been obvious to modify Yan (CREWES 2000 or 2001) to include a computer with a programmable processor to process the data obtained by the hydrophones and geophones as taught by Corrigan in order to have a device to quickly and efficiently process the data and control the system.

With regard to claim 21, Yan does not disclose a storage medium containing a program for the data processor of claim 20. Corrigan discloses a computer system including a programmable data processor and a storage medium containing a program (hard disk, floppy disk, magnetic tape) for taking seismic data measurements and processing the data using ocean bottom hydrophones and geophones (Fig. 4) (abstract; Columns 5-6). It would have been obvious to modify Yan (CREWES 2000 or 2001) to include a computer with a programmable processor and storage medium containing a program to process the data obtained by the hydrophones and geophones as taught by Corrigan in order to have a device to quickly and efficiently process the data and control the system.

With regard to claim 22, Yan discloses a seismic surveying apparatus comprising a source of acoustic energy, a receiver spatially separated from the source, and an apparatus as defined in claim 16 (Page 1, 4-6; Page 7, Numerical Examples to Page 9) (Figs. 1-5).

With regard to claim 23, Yan discloses a ranging apparatus comprising a source of acoustic energy, a receiver located proximate to the source, and an apparatus as defined in claim 16 (Page 1, 4-6; Page 7, Numerical Examples to Page 9) (Figs. 1-5).

Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Yan (CREWES 2001) in view of Corrigan as applied to claims 1-4 above.

With regard to claim 7, Yan discloses that the vertical component of particle motion is the vertical component of particle velocity, not particle acceleration. It is known that velocity is the time derivative of acceleration, and that both are measures of

Art Unit: 3663

the particle motion. It would have been obvious to modify Yan to include using particle acceleration sensors (accelerometers) instead of particle velocity sensors as both are known and used in the art.

Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Yan (CREWES 2000) in view of Corrigan as applied to claims 1-4 above.

With regard to claim 7, Yan discloses that the vertical component of particle motion is the vertical component of particle velocity, not particle acceleration. It is known that velocity is the time derivative of acceleration, and that both are measures of the particle motion. It would have been obvious to modify Yan to include using particle acceleration sensors (accelerometers) instead of particle velocity sensors as both are known and used in the art.

Claims 12-14 and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yan (CREWES 2001 or CREWES 2000) in view of Corrigan as applied to claims 1 and 16 above, and further in view of Monk.

With regard to claim 12, neither Yan reference discloses determining the path length of acoustic energy from the source to the receiver from the direct arrival of acoustic energy at the receiver. Monk teaches a method of analyzing seismic data involving separating up-going and down-going wavefields (Columns 1-2). Monk teaches that the travel times of the detected waves from the source to the receivers can be used to determine distances (Column 1, Lines 50-65). It would have been obvious to

Art Unit: 3663

modify Yan (CREWES 2000 or 2001) to include using the travel times of the direct arrival waves to determine distances (path length of the wave) to the receivers in order to be able to determine the geometry of the subsurface structures from the pathlengths of the waves and the locations of the receivers from the source (pathlength of direct wave to travel from source to receiver).

With regard to claim 13, neither Yan reference discloses that the source is spatially separated from the receiver, and that the path length of seismic energy from the source to the receiver is indicative of the separation between the source and the receiver. Monk teaches that the travel times of the detected waves from the source to the receivers can be used to determine distances (Column 1, Lines 50-65). It would have been obvious to modify Yan (CREWES 2000 or 2001) to include using the travel times of the direct arrival waves to determine distances (path length of the wave) to the receivers in order to be able to determine the geometry of the subsurface structures from the pathlengths of the waves and the locations of the receivers from the source (pathlength of direct wave to travel from source to receiver).

With regard to claim 14, neither Yan reference discloses that the source is proximate to the receiver, and that the path length of seismic energy from the source to the receiver is indicative of the range from the source and receiver to a reflector of acoustic energy. Monk teaches that the travel times of the detected waves from the source to the receivers can be used to determine distances to reflectors in the subsurface (Column 1, Lines 50-65). It would have been obvious to modify Yan (CREWES 2000 or 2001) to include using the travel times of the direct arrival waves to

Art Unit: 3663

determine distances (path length of the wave) to the receivers in order to be able to determine the geometry of the subsurface structures from the pathlengths of the waves and the locations of the receivers from the source (pathlength of direct wave to travel from source to receiver).

With regard to claim 19, neither Yan reference discloses means for determining the path length of acoustic energy from the source to the receiver from the direct arrival of acoustic energy at the receiver. Monk teaches that the travel times of the detected waves from the source to the receivers can be used to determine distances (Column 1, Lines 50-65). It would have been obvious to modify Yan (CREWES 2000 or 2001) to include using the travel times of the direct arrival waves to determine distances (path length of the wave) to the receivers in order to be able to determine the geometry of the subsurface structures from the pathlengths of the waves and the locations of the receivers from the source (pathlength of direct wave to travel from source to receiver).

Conclusion

The cited prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Scott A. Hughes whose telephone number is 571-272-6983. The examiner can normally be reached on M-F 9:00am to 5:30pm.

Art Unit: 3663

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jack Keith can be reached on (571) 272-6878. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



SAH

Danah Hughes
PRIMARY EXAMINER
LU 3663.